What is claimed is:

1. A multidimensional crossbar network in which a plurality of processor nodes logically, multidimensionally arranged are connected to each other via a plurality of crossbar switches,

wherein a switching device connected to first and second crossbar switches and a third crossbar switch is provided on each packet transmission path connecting the first and second crossbar switches, and by the switching device, a packet is exchanged among the first, second, and third crossbar switches, and interface conversion for performing packet communication by a light signal with any of the crossbar switches is performed.

2. A multidimensional crossbar network having a plurality of X, Y, and Z axis crossbar switches for connecting a plurality of processor nodes logically, multidimensionally arranged to each other,

wherein a switching device for selectively transferring reception packets from the X axis and Y axis crossbar switches to the Z axis crossbar switch is provided on each packet transmission path between the X axis crossbar switch and the Y axis crossbar switch.

3. The multidimensional crossbar network according to claim 2, wherein the switching device comprises:

a first input/output port for communicating packets with one of input/output ports of the X axis crossbar switch;

a second input/output port for communicating packets with one of input/output ports of the Y axis crossbar switch;

a third input/output port for communicating packets with an optical module including a light-emitting element and a light-receiving element; and

means for performing interface conversion of a transmission and reception packet between the first and second input/output ports and the third input/output port,

wherein a part of a packet transmission path between the Y axis crossbar switch and the Z axis crossbar switch is made by an optical fiber coupled to the optical module.

4. The multidimensional crossbar network according to claim 2, wherein the interface conversion means processes a packet transmitted or received by the first and second input/output ports and a packet transmitted or received by the third input/output port with different sync clocks independent of each other.

5. The multidimensional crossbar network according to claim 3, wherein the interface conversion means processes a packet transmitted or received by the first and second input/output ports and a packet transmitted or received by the third input/output port with different sync clocks independent of each other.

6. A multidimensional crossbar network comprised of first and second crossbar networks in each of which a plurality

of processor nodes multidimensionally arranged are connected to each other via a plurality of X, Y, and Z axis crossbar switches, wherein each of said crossbar networks comprises:

a plurality of X axis crossbar switches for performing packet exchange in the X axis direction among a plurality of processor nodes having the same Y, Z coordinate values in a three-dimensional coordinate system;

a plurality of Y axis crossbar switch groups for performing packet exchange in the Y axis direction among a plurality of X axis crossbar switches accommodating processor nodes having the same Z coordinate value in a three-dimensional coordinate system; and

a plurality of Z axis crossbar switches for performing packet exchange in the Z axis direction between the plurality of Y axis crossbar switch groups,

two Y axis crossbar switches in positions corresponding to each other in the first and second crossbar networks are coupled to each other via a plurality of switching LSIs disposed on each of packet paths between the Y axis crossbar switches and Z axis crossbar switches, and packet exchange between the first and second crossbar networks is performed by each of the switching LSIs.

7. The multidimensional crossbar network according to claim 6, wherein each of the switching LSIs comprises:

first and second input/output ports for communicating

packets with the two Y axis crossbar switches;

third and fourth input/output ports for communicating packets with first and second optical modules each having a light-emitting element and a light-receiving element; and

means for selectively outputting reception packets from the first and second input/output ports to the other one of the first and second input/output ports or the third or fourth input/output port in accordance with header information, and transferring reception packets from the third and fourth input/output ports to the first and second input/output ports, respectively, and

a part of a packet transmission path between each of the Y axis crossbar switches and each of the Z axis crossbar switches is made by an optical fiber coupled to each of the optical modules.

8. A multidimensional crossbar network comprising:

a plurality of X axis crossbar switches for performing packet exchange in the X axis direction among a plurality of processor nodes having the same Y, Z coordinate values in a three-dimensional coordinate system;

a plurality of Y axis crossbar switch groups for performing packet exchange in the Y axis direction among a plurality of X axis crossbar switches accommodating processor nodes having the same Z coordinate value in a three-dimensional coordinate system; and

a plurality of Z axis crossbar switching means for performing packet exchange in the Z axis direction between the plurality of Y axis crossbar switch groups, wherein

each of the Z axis crossbar switching means comprises:

a first group of switching LSIs each having a first input/output port group connected to input/output ports in corresponding X axis coordination positions of a plurality of Y axis crossbar switches having the same X axis coordinate value in a three-dimensional coordinate system, and a second input/output port group connected to a plurality of optical modules each including a light-emitting element and a light-receiving element;

a second group of switching LSIs each having a first input/output port group connected to input/output ports in corresponding X axis coordinate positions in other plurality of Y axis crossbar switches having the same X axis coordinate value in a three-dimensional coordinate system, and a second input/output port group connected to a plurality of optical modules each including a light-emitting element and a light-receiving element; and

a plurality of pairs of optical fibers coupled between the second input/output port group in the first group of switching LSIs and the second input/output port group in the second group of switching LSIs via optical modules.

9. An L x M x N multidimensional parallel computer

system comprising:

a plurality of X axis boards each accommodating L processor nodes and an X axis crossbar switch having L external input/output ports;

a plurality of Y axis boards each accommodating a Y axis crossbar switch including M input/output ports and a plurality of switching LSIs connected to the input/output ports of the Y axis crossbar switch, each of said switching LSIs having external input/output ports for connection to the X axis crossbar switch and input/output ports for connection to an optical module for transmitting and receiving a light signal;

a plurality of Z axis boards each accommodating a Z axis crossbar switch having N input/output ports and a plurality of interface conversion LSIs connected to the input/output ports of the Z axis crossbar switch, each of said interface conversion LSIs having input/output ports for connection to an optical module for transmitting and receiving a light signal;

a plurality of electric signal lines connecting the external input/output ports of the X axis crossbar switch and the external input/output ports on the Y axis board; and

a light signal line connecting the optical module for transmitting/receiving a light signal on the Y axis board and the optical module for transmitting/receiving a light signal on the Z axis board.